Route to:

Return to:

# INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

# GAS ABSTRACTS

JANUARY, 1955

VOLUME 11 NUMBER 1

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

# CONTENTS


1. Gas Industry ..... 1
2. Appliances ..... 2
3. Combustion and Industrial Furnaces ..... 4
4. Carbonization and Gasification ..... 6
5. Natural Gas and Natural Gas Condensates ..... 8
6. Petroleum and Synthetic Liquid Fuels ..... 10
7. Analytical Methods and Tests ..... 10
8. General and Physical Chemistry ..... 12
9. Organic Chemistry ..... 13
10. Chemical Engineering ..... 14
11. Process Equipment and Instrumentation ..... 15
12. Materials of Construction ..... 15



GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $18.00 per year to U.S. addresses; $22.00 foreign.—Printed in the U.S.A.


Copyright 1955 by the Institute of Gas Technology.



A special microfilm edition of Gas Abstracts can be supplied by University Microfilms, 313 N. First St., Ann Arbor, Michigan.

# 1. GAS INDUSTRY

## Amended FPC Controls?

INGAA RESOLUTION CALLS FOR CONGRESSIONAL ACTION IN WAKE OF PHILLIPS DECISION. *Gas* 30, 71-72. (1954) October.

At its annual meeting in New Orleans in September, the Independent Natural Gas Association of America recommended that Congress enact an amendment to the Natural Gas Act to free production of gas from Federal Power Commission jurisdiction, imposed as the result of the Supreme Court's decision in the Phillips Petroleum case. Publishers Abstract

## Columbia Gas Expansion

MORE GAS FOR COLUMBIA. *Gas* 30, 51-61 (1954) October.

On Nov. 1, the Columbia Gas System was scheduled to begin receiving 375 MMCF per day of natural gas from the new Gulf Interstate Gas Co. pipeline. Originally drawing all its gas supplies from the Appalachian area, Columbia last year imported 74% of the total from the Southwest, but was still far short of its requirements. The System has arranged to purchase its own gas in Louisiana fields and have it transported through the new Gulf Interstate line. Columbia Gas System is spending $114 million to enable it to handle the new supplies of gas. This four-part study tells why more Southwest gas was essential, how United Fuel Gas Co., a member company of the system, will transmit the gas to other utilities, how Ohio Fuel Gas Co. has undertaken the largest construction program in its history, and plans of the Pittsburgh Group to use the gas in its system.

Publishers Abstract

## Competitive Advertising

Abell, C. WHEN YOU MUST FIGHT ARRANGE TO WIN. *Butane-Propane News*, 16, 31-35 (1954) October.

A very good approach for countering the advertising of competing services when such advertising contains half truths or untruths. Three case histories are presented in which LP-gas dealers effectively countered electric company advertising by presenting the true case to protect existing customers rather than wrangling with the competition in public.

R. T. Ellington

## Dakota Supply

Hertz, W. NORTH DAKOTA'S FEAST AND FAMINE. *Gas Age*, 114, 64, 65, 109, 110, 112, 114 (1954) October 7.

Though the state has estimated reserves of 500 billion cu ft, only three cities now have natural gas. Northern Natural Gas and North Dakota Natural Gas Transmission are competing for the privilege of serving eastern cities in the state. The first petition of North Dakota Natural was set aside on arguments such as lack of storage, lack of future capacity, initial intentions to supply 83% of its gas to industrial customers, contract escalator clauses tying the price of gas to that of No. 6 oil at Houston, and others brought up by the contesting lignite industry. R. T. Ellington

## Construction Approvals

SIX-MONTH APPROVALS TOTAL $324 MILLION. *Gas* 30, 168, 172. (1954) October.

Forty-five hundred miles of pipeline which will add almost 1.5 billion cubic feet of daily delivery capacity to the nation's natural gas transmission systems were approved between Jan. 1 and June 30, 1954. Since Feb. 7, 1942, the FPC has authorized construction and operation of more than 59,000 miles of line and 4.2 million hp in compressor facilities.

Publishers Abstract

## Engineering Education

RESEARCH UNDER STATE ASSOCIATION SPONSORSHIP MARKS GAS ENGINEERING PROGRAM AT MICHIGAN. *Gas* 30, 69-70. (1954) October.

The second installment in a series on gas engineering schools. Since 1900 the University of Michigan has had the cooperation of the Michigan Gas Association, which for 40 years sponsored an industrial fellowship to support students in graduate study and research in the field of gas engineering. During the past 10 years, the research under the Michigan Gas Associa-

tion program has consisted of a highly integrated series of investigations on the rates of the reactions between carbon monoxide, carbon dioxide, and hydrogen to produce methane and other hydrocarbons. At present, the program is investigating the economics of high-Btu gas production. Publishers Abstract

### Northwest Gas Rates

Herrman, W. J. WHAT ABOUT RATES WITH NATURAL GAS? *Gas Age*, 114, 15-18, 47 (1954) October 21: *Gas*, 30, 75-79 (1954) October

The introduction of natural gas into the Pacific Northwest, which is expected shortly, will require a revision in the gas load and the gas rate structure. Present and projected costs must be studied and a market survey of potential loads made to aid in determining the new rates. Consideration must be given to space heating, residential load development through multiple use of appliances, commercial, industrial and interruptible loads and gas-oil price differential. Based on his experience with the Southern California Gas Co., the author discusses the development of possible rate schedules for the cities of Portland and Seattle, considering the above named factors. E. J. Pyrcioch

### Portland Gas Supply

PORTLAND SPURNS PACIFIC'S "CONTRACT DEMAND" OFFERS. *Gas* 30, 80-81. (1954) October.

Portland Gas & Coke Co. has refused to contract for natural gas from Pacific Northwest Pipeline Corp. President C. H. Gueffroy points out the unique circumstances in his company's operation that make it imperative that caution be exercised in making any move to change from manufactured gas to natural gas despite the rapidity with which other distributing utilities in the area have completed contract negotiations. Portland is seeking a contract predicated on "annual measured demand."

Publishers Abstract

## 2. APPLIANCES

### Air Conditioning

Cummings, W. W. METHOD OF AIR CONDITIONING. U. S. 2,690,656 (1954) October 5.

The capacity of an air conditioning system using a conventional compression type refrigeration system is increased by adding a sorbent system for dehumidification of air which is subsequently cooled by brine from the refrigeration unit. The sorbent cycle is operated with heat gained by exchange with the condenser of the compression refrigeration unit. Air conditioning capacity is claimed to be double without materially increasing operating cost.

J. F. Reed

### Air Conditioning Sales

Cunningham, M. TEXAS MARKS THE TRAIL TOWARD A BOOM IN ALL-YEAR AIR CONDITIONING WITH GAS. *Gas* 30, 62-66. (1954) October.

A strong sales program in commercial and industrial as well as domestic air conditioning has put more than 2500 Servel absorption units on the distribution lines of Lone Star Gas Co. of Dallas. Big jobs engineered and sold by Lone Star include a 126,000-sq-ft valve manufacturing plant, and five large buildings now under construction with a total tonnage of 7200. These will bring the total tonnage in the system to more than 50,000. Publishers Abstract

### Appliance Testing

Kroeger, C. V. HOW TESTING AIDS MERCHANDISING. *Am. Gas J.*, 181, 43-44, 48 (1954) September.

A brief article in which the author gives a few suggestions for shop testing of basic appliances. Also included is a list of tools needed for appliance testing and adjusting. J. G. Chalcraft

### Burners

Edwards, M. R. (assigned to Springfield Burner Corp.) GAS BURNER AND SUPPORT. U. S. 2,692,643 (1954) October 26.

Huber, L. and Dürr, W. (assigned to Swingfire (Bahamas) Ltd.) INTERMITTENT COMBUS-

TION DEVICE PROVIDED WITH MEANS FOR CONTROLLING THE COMBUSTION GAS FLOW THEREIN. U. S. 2,695,053 (1954) November 23.

MacCracken, C. D. (assigned to Jet-Heet, Inc.) BURNER FOR LIQUID AND GASEOUS FUELS. U. S. 2,692,014 (1954) October 19.

Murray, E. G. ADJUSTABLE ORIFICE GAS-AIR MIXER NOZZLE. U. S. 2,692,644 (1954) October 26.

Stauff, E. (assigned to The French State) DEVICE FOR DEFLECTING A HIGH-SPEED JET OF GAS EJECTED THROUGH A NOZZLE. U. S. 2,694,898 (1954) November 23.

## Controls and Ignition

Caparone, M. J. and Arden, T. T. (assigned to Robertshaw-Fulton Controls Co.) SAFETY CONTROL AND IGNITION APPARATUS FOR GASEOUS FUEL BURNERS. U. S. 2,695,056 (1954) November 23.

Cretzler, D. J. (assigned to Milwaukee Gas Specialty Co.) FLOW MODULATING VALVE. U. S. 2,696,350 (1954) December 7.

Grayson, J. H. (assigned to General Controls Co.) THERMOSTATIC GAS COCK. U. S. 2,693,200 (1954) November 2.

Hoff, J. M., and Wanrer, E. L. (assigned to The Tappan Stove Co.) AUTOMATIC IGNITION AND CONTROL MECHANISM FOR GASEOUS FUEL BURNERS. U. S. 2,693,232 (1954) November 2.

Porter, L. E. (assigned to Minneapolis-Honeywell Regulator Co.) COMPONENT CHECKING BURNER CONTROL APPARATUS FOR STANDING PILOT SYSTEMS. U. S. 2,695,661 (1954) November 30.

Winet, H., and Käser, A. (assigned to Landis & Gyr, A. G.) GAS BAKING OVEN TEMPERATURE REGULATOR. U. S. 2,694,525 (1954) November 16.

## Drier

Smith, E. H. (assigned to Lovell Manufacturing Co.) DRIER. U. S. 2,694,867 (1954) November 23.

## Heating System

Hood, H. C. NEW BURNERS IN STATE BUILDING PROVE HIGHLY SATISFACTORY. *Gas*, 30, 73-74 (1954) October.

The state building in Los Angeles is one notable example where the use of modern, dual-fuel burner installations has proven highly successful. The author describes the system and its operation. Publishers Abstract

## Incinerators

Vandaveer, F. E. GAS INCINERATOR CHARACTERISTICS: ACCEPTANCE, SERVICING AND LOAD. *Am. Gas Assoc. Monthly*, 36, 33-34 (1954) October.

There are now 31 while nine years ago there were only three or four manufacturers of approved incinerator units. As yearly domestic load builders incinerators rank below only space heating and water heating, using an average of 1250 CF/month on tests made in Cleveland. The main objections which require correction seem to be smoke and odor. Some air pollution officials are objecting to incinerators though they rank far below domestic coal furnaces, central stations and automobiles in this respect.
R. T. Ellington

## Solar Refrigerator

Hedlund, A. W. REFRIGERATION UNIT UTILIZING SOLAR ENERGY. U. S. 2,692,483 (1954) October 26.

An absorption refrigeration unit is described in which solar energy is used to heat the generator. The system is of the ammonia-water-hydrogen type. The generator is disposed outside a wall which houses the system. J. F. Reed

## Space Heating

Lehane, T. J., Smith, W. M., and Ernst, R. D. (assigned to Vapor Heating Corp.) SPACE HEATING SYSTEM. U. S. 2,694,526 (1954) November 16.

Ruhl, C. L. GAS-FIRED HEATER AND RADIANT THEREFOR. U. S. 2,696,205 (1954) December 7.

## 3. COMBUSTION AND INDUSTRIAL FURNACES

### Burner Flames

Grumer, J., Harris, M. E. and Rowe, V. R. STUDY OF THE YELLOW-TIPPING CHARACTERISTICS OF FUEL GASES. Interim Research Rept. No. 2, AGA Proj. PDC-3; Amer. Gas Assoc., New York, 20 pp., $1.00 (1954) July.

The Bureau of Mines is currently engaged in a cooperative agreement with the American Gas Association on a fundamental study of yellow-tipping of fuel gases which will supplement the work on flash-back and blow-off. It is the purpose of this report (Interim Report No. 2) to introduce to the gas industry new developments pertaining to the yellow-tipping characteristics of gas burner flames in free air. Yellow-tipped flames are undesirable in most gas appliances. It is correspondingly important to gain understanding of the fundamental nature of the yellow-tipping phenomena to guide the design of burners and the choice of fuels so that such flames may be avoided when necessary. Yellow-tip limits representative of most fuels have now been measured and are being correlated by the following concept. For each fuel there exists a minimum characteristic fuel-air ratio that produces yellow in its flame. This is called the constant yellow-tip limit of the fuel and is designated by the symbol $F_c$. When secondary air diffuses into the flame the fuel-air ratio is leaner in the flame than in the burner and the apparent yellow-tip limit for the burner and the fuel becomes correspondingly richer. This is called the yellow-tip limit for the fuel and burner. It is designated by the symbol $F_y$. Values of $F_c$ have been determined for all single-component yellow-tipping fuels of interest to the gas industry. $F_c$ values of mixtures of fuels are easily calculated by taking a weighted average of the $F_c$ values of the yellow-tipping constituents of the mixture. $F_y$ values are graphically related to $F_c$. Definitions, details of theory, methodology and supporting data are given in the report. Authors' Abstract

### Candy-Making Fuel

Capper, H. THE USE OF GAS IN SUGAR CONFECTIONERY. *Ind. Gas* (British), 17, 332, 4-6, 38, 40, 41, August; 375, 6, 8, 380, 82, 84, 86 (1954) September.

This article gives a very good discussion of the basic processing of materials and the heating methods employed in confectionery operations.
R. T. Ellington

### Commercial Hot Water

Reiter, F. M. HOT WATER FOR LARGE VOLUME NEEDS. *Ind. Gas*, 32, 3, 6, 24 (1954) June; 33, 8-9, 24, July; 6-9, 24, August; 5-7, 18, 19, September; 8, 9, 20-22, October; 8, 9, 23-24, November; 8, 9, 23-24 (1954) December.

This series covers such topics as the methods of heating water in large quantities, proper use of heat exchangers in operations such as laundries, heating industrial solutions directly and indirectly, and use by hotels, apartments and restaurants (with various requirements and diversity factors). Factors influencing the cost of hot water, the competitive merits of various fuels to do the job and the solutions to various operating problems are given in the last two parts. R. T. Ellington

### Drying Costs

Van Kampen, G. R. HOW DO COSTS COMPARE FOR DRYING? *Ind. Gas*, 33, 9, 18, 19 (1954) August.

The efficiencies obtained with steam, gas burners, or electricity in drying paper or textiles are remarkably similar in well-planned installations. With 40 to 50 percent efficiency considered good under practical conditions, the proper fuel and equipment to use is relatively easy to determine by balancing fuel, operation and maintenance and installation costs.
R. T. Ellington

### Fuel Comparisons

Beck, C. V. COMPERATIVE EFFICIENCIES, COAL, OIL, GAS. *Coal Heat*, 67, 16-17 (1954) October.

In his discussion of the efficiencies of coal, oil and gas as fuels, the author emphasizes the high hydrogen content of gas but neglects the fact that "the good coal of 5 percent moisture content" also contains about 5% hydrogen by ultimate analysis, dry basis, which would yield on combustion 855 lb water per ton. This,

plus the 100 lbs of moisture, would show coal to yield *one third, not one-thirtieth* as much water as natural gas, on a comparable basis. The useful heat which the customer recovers from any fuel will depend far more profoundly on the design and operation of the particular heating equipment. This article is similar to advertising in which facts are selected to support statements against the gas industry, and should be examined carefully by sales engineers.

O. P. Brysch

## Heat Treating

Hartwig, C. H. SIXTY-CYCLE INDUCTION HEATING OF LARGE STEEL SECTIONS FOR HOT FORMING. *Ind. Heating*, **21**, 1732, 34, 1880, 82 (1954) September.

A number of aspects of low frequency induction heating are presented. Since the depth of eddy current penetration into the work varies inversely with frequency, at 60 cycles approximately 86% of the heat is generated within 2" of the surface of the work. Plots of current distribution are shown along with the change in distribution occurring when part of the material passes the Curie point. A plot of heating efficiency versus billet dimensions is also presented. For cross sections of less than 36 sq in higher frequencies are recommended.

R. T. Ellington

Peacock, P. E., Jr. HOW TO REDUCE HEAT TREATING COSTS WHEN USING AMMONIA. *Ind. Heating*, **21**, 1952-54, 56, 58 (1954) October.

A cost balance between use of portable ammonia cylinders and a refillable storage tank is presented. Many details on installation and operation of tank type storage are given.

R. T. Ellington

## Furnace Design

Olinger, S. T. NEW DEVELOPMENTS IN RAPID MELTING OF BRASS. *Ind. Gas*, **33**, 14, 23-24 (1954) October.

This article, adapted from AGA Information Letter No. 63, discusses some of the new developments in rapid heating of brass in which heats are ready for tapping in fifteen minutes with gas inputs of 6-10 cf. per pound of metal capacity. Overall consumptions per pound of metal poured ran from 1.6 to 2.6 cents in the lengthy tests reported. R. T. Ellington

CONTINUOUS ANNEALING OF STAINLESS STEEL SHEETS IN ROLLER HEARTH FURNACE. *Ind. Heating*, **21**, 1718-20, 22, 24, 1875-76, 78 (1954) September.

Elements of furnace construction including those for the water-cooled refractory roller-hearth and the 140 silicon carbide radiant tubes are given. Annual replacement on the radiant tubes is 10% or less. The radiant tubes are fitted with core-busters to insure as good conduction as possible through the tube wall. Seven temperature control zones permit precise control of heating cycles. R. T. Ellington

10-TON CAPACITY HOLDING FURNACE. *Gas World* (British) **140** (suppl.) 72-74 (1954) October 16.

This covered ladle-type furnace receives material from two iron melting furnaces. Five 300,000 Btu nozzle-mixing tunnel-burners are mounted in the roof but inputs for normal operation are only about 900,000 Btu. Temperature is controlled by a radiation pyrometer. The slag layer adequately prevents carbon loss. A neutral atmosphere is maintained by burner adjustment. Gas consumptions vary from 11 to 17 therms per ton of metal depending mainly on the incidence of timing repairs.

R. T. Ellington

WESTINGHOUSE BUILDS MAMMOTH FURNACE. *Gas* **30**, 107 (1954) October.

Single or multiple parts weighing up to 100 tons can be heat-treated in a car-type furnace installed at Westinghouse Electric Corp.'s East Pittsburgh (Pa.) works. Publishers Abstract

## Refrigeration

Scafe, L. R. BETTER REFRIGERANT PIPING FOR PARALLEL COMPRESSOR SYSTEMS. *Heating, Piping and Air Conditioning*, **26**, 107-109 (1954) October.

Faulty piping is often the cause of failure in parallel compressor refrigerating systems. What happens when suction piping is not correctly designed is discussed here.

Author's Abstract

# 4. CARBONIZATION AND GASIFICATION

## Coal Gas

Gaskill, M. S. CARBONISATION—PRESENT AND FUTURE. *Gas World* (British) **140**, 1058-63, 1074 (1954) October 30.

The present relationship of carbonization to the British gas industry is reviewed. Of 574.2 billion CF, 505.7 billion (88%) was made in the gas plants and 68.5 billion (12%) was purchased from coke ovens. Of the 924 gas industry plants, 21 large plants had about 30% of the actual daily production capacity, and 314 plants of 1 to 2 million CF daily capacity produced an additional 63%. Water gas accounts for 30.7% of total capacity, usually as peak load and diluent gas. Types of carbonizing plant and their operation, efficiency, and fuel requirements are discussed. Future operations will use increasingly the oil gasification and complete (oxygen) gasification processes but only as auxiliaries to the conventional methods. The latter will face difficult problems due to deterioration in supply and quality of suitable coking coals.

O. P. Brysch

## Coal Sampling

Tomlinson, R. C. EXPERIMENTS TO DETERMINE THE ERRORS OCCURRING IN THE PREPARATION OF COAL SAMPLES FOR LABORATORY ANALYSIS. *J. Inst. Fuel* (British), **27**, 515-522 (1954) October. 616-18 (1954) December.

The problems of measuring the errors which can arise in preparing a laboratory sample from a gross sample of coal are discussed, and some preliminary experiments carried out by the Divisional Scientific Service of the National Coal Board are described. These experiments were intended to determine the order of magnitude of the errors obtained in practice when carrying out determinations for ash content and to indicate the most important factors contributing to these errors. The most interesting results were perhaps that the magnitude of the errors did not appear to depend on the weight of the original sample, and that in certain cases most of the errors occurred at the second stage of the reduction process. There was an indication that the errors with mechanical sample-dividers might be less than those obtained with riffles. Further work is being carried out to investigate the specific points which have been revealed. Author's Abstract

## Coal Structure

Schuyer, J. and Van Krevelen, D. W. CHEMICAL STRUCTURE AND PROPERTIES OF COAL VI—CALORIFIC VALUE. *Fuel* (British), **33**, 348-354 (1954) July.

An equation is derived by means of which, in principle, the calorific value of a coal can be calculated from data on its chemical composition and structure. Unlike most earlier equations, this relation holds not only for coal but also for any other organic compound. The results are in good agreement with the experimental data. As the influence of structural effects on the heat of combustion is relatively small, it is impossible to derive new structural data from the heat of combustion. Authors' Abstract

Van Krevelen, D. W. and Chermin, H. A. CHEMICAL STRUCTURE AND PROPERTIES OF COAL V—AROMATICITY AND VOLATILE MATTER. *Fuel* (British), **33**, 338-347 (1954) July.

A graphical-statistical method is developed which enables the aromatic carbon fraction of coal to be determined when the value of specific gravity at 20° C. and the elementary analysis are known. The aromatic carbon fraction so calculated proves to be in reasonable agreement with the fraction calculated by the method of structural group analysis presented in Part I of this series. There is a distinct relationship between the fixed carbon content (found in the volatile matter determination) and the aromatic carbon fraction. As a first approximation, the aromatic fraction may therefore be calculated from the content of volatile matter.

Authors' Abstract

Zwietering, P. and Van Krevelen, D. W. CHEMICAL STRUCTURE AND PROPERTIES OF COAL IV—PORE STRUCTURE. *Fuel* (British), **33**, 331-337 (1954) July.

The pore structure of coal was investigated by means of gas adsorption at room temperature, density measurements in helium at low temperatures and determination of the penetration

of mercury at high pressures. The results indicate that, in addition to a very wide macropore distribution with a low surface area, very fine pores also exist in the coal. The character of these micropores suggests that they may be considered as being inherent to the molecular structure of the coal itself, similar to the well known cages in many organic crystals.

Authors' Abstract

## Inert Gases

Funk, E. J., Jr. INERT GAS GENERATORS FOR CHEMICAL PROCESSING. *Ind. Gas*, 33, 10, 21-24 (1954) August.

This article, adopted from AGA Information Letter No. 64, describes the inert gases most used in chemical processing, the equipment used for producing them, and applications such as blanketing paint in tanks, vitamin and synthetic fiber production and catalyst protection.

R. T. Ellington

## Reforming Plant

Gee, H. W. HOW COMPLETELY AUTOMATIC PLANT WORKS. *Gas Age*, **114**, 66-67 (1954) October 7.

An automatic Hasche reformer for a relatively small send-out of 675 Btu/CF gas is described. Numerous controls, based on the gas-holder level, were developed to make the plant operation safe and free from supervision as possible. Results show the possibility of a control "package" for reforming plants. W. G. Bair

## Smokeless Fuel

SOLID SMOKELESS FUEL PRODUCTION. *Coke and Gas* (British) **16**, 383-89 (1954) October.

The Rexco low temperature carbonizing plant operated by the Midland Rexco Ltd. of National Carbonizing Co., Ltd. at Mansfield (Notts.), has been enlarged by addition of a new retort and ancillaries. Improved heating methods have resulted in a throughput of 55 tons coal per day, as compared with 45 tons for each of the two older (1933) retorts. Primary tar and producer gas are the chief byproducts.

O. P. Brysch

## Sulfur Removal

Mayland, B. J. (assigned to Phillips Petroleum Co.) DESULFURIZATION IN THE GASIFICATION OF COAL. U. S. 2,691,573 (1954) October 12.

This patent refers to a method for the removal of sulfur during gasification of a carbonaceous material. Iron or another metal carbonyl, formed from finely divided iron and a portion of the carbon-monoxide-containing gas from the gasification step, is condensed on the surface of the coal particles which are then fed into the gasification chamber. At the temperature of gasification, the carbonyl after decomposing to elemental iron reacts with the sulfur compounds to form iron sulfide, which is taken off with the ash, resulting in a gasification product with a lowered sulfur content. K. C. Channabasappa

## Synthesis Gas

Herbst, W. A. (assigned to Standard Oil Development Co.) PREPARATION OF HYDROCARBON SYNTHESIS GAS. U. S. 2,690,963 (1954) October 5.

The patent refers to a process for synthesizing liquid or gaseous hydrocarbons from synthesis gas prepared by the fluid catalytic cracking of methane or other normally gaseous hydrocarbons. The nickel-chromium-kaolin catalyst used is continuously regenerated in a separate fluidized bed. C. G. von Fredersdorff

## Tar Refining

Hyde, E. H. METHOD AND MEANS FOR TREATMENT OF COAL DISTILLATION GASES AND VAPORS. U. S. 2,692,849 (1954) October 26.

Highly improved tar from coal carbonization is obtained by fractional separation of the suspended breeze (grit) and free carbon particles. This is achieved by directing the gas stream from the oven standpipe into a baffle-filled chamber interposed ahead of the usual gas collecting main. The baffles, arranged in parallel staggered rows, are suspended vertically and flushed continuously with gas liquor to remove the heavier grit to a settling tank, while the hot gases, after a tortuous path through the chamber, are condensed and the grit-free tar then obtained is further freed of suspended matter (carbon) by centrifugalization.

O. P. Brysch

# 5. NATURAL GAS AND NATURAL GAS CONDENSATES

## Compressors

Wagner, E. R. HOW TO MAINTAIN COMPRESSORS. *Petroleum Ref.*, 33, 147-51 (1954) October.

Methods of maintenance of the power end of gas-engine-driven compressors are described. In a compressor station having ten 1600 hp. eight cylinder two-cycle engines, downtime was reduced from 4.7 to 1.04 percent by these methods. D. V. Kniebes

## Condensate-Well Tester

Attaway, C. D. A PORTABLE FULL-SCALE TESTER FOR HIGH-PRESSURE GAS CONDENSATE WELLS. *Gas* 30, 182, 184. (1954) October.

Where producers sell not only extracted products and liquid production of high-pressure gas condensate wells, but also the gas produced therefrom, to natural gas companies operating natural gasoline plants in the area, the common practice is to allocate a percentage of actual plant production to the well owners based upon the potential recoverable hydrocarbon content of the gas. To do this, each well must be tested at regular intervals to determine its content. Gas wells prorated to flows less than 1.5 MMCF daily cannot be tested with the NGAA "split-stream" or "stringer" test. Arkansas Louisiana Gas Co. uses the full-scale separator test, but to get the desired results engineered its own portable, trailer-mounted tester, described in the article. Publishers Abstract

## Conditioning

Vaughan, A. L. NATURAL GAS CONDITIONING PROCESSES FOR HIGH PRESSURE TRANSMISSION. Amer. Gas Assoc. Operating Sect. Paper No. OS-54-1, (1954) October 11-13.

Gas conditioning, which more commonly includes dehydration, hydrocarbon extraction and removal of hydrogen sulfide and carbon dioxide, is increasing in importance as the demand for natural gas exceeds the available supply of clean gas. Dehydration is generally accomplished by absorption by glycol-water solution or by absorption by solid desiccants. A greater degree of drying is possible with the desiccants although the plant cost is higher. For hydrocarbon extraction, the oil absorption process is the most satisfactory. Hydrocarbons are absorbed in a mineral oil, distilled, and the condensed liquid fractionated into the various products. Hydrogen sulfide and carbon dioxide may be removed by reaction with monoethanolamine (MEA) in a water solution. Equipment corrosion is a serious problem in these acid gas removal plants. The Permian Basin Pipeline Co. in Pecos County, Texas is operating a MEA plant designed to process 36 MMCF/D of natural gas containing 30% carbon dioxide, such to be the only one of its kind with respect to the percentage of carbon dioxide removal. Removal of nitrogen has been drawing attention recently, with refrigeration appearing to be the most feasible method for accomplishing removal of the nitrogen from natural gas.

E. J. Pyrcioch

## Dehydration Methods

Campbell, J. M. DEHYDRATION OF LIGHT HYDROCARBON LIQUIDS. PART I: DEHYDRATION METHODS. *Pipe Line Ind.*, 1, 52-54 (1954) October.

An elementary discussion of the physical properties of hydrocarbon-water mixtures and of the use of dry dessicants. S. A. Weil

## Dust Removal

Diebold, P. SEPARATOR FOR DUST CARRYING GASES. U. S. 2,690,813 (1954) October 5.

This apparatus for the removal of dust from a gaseous medium consists of a cyclone formed by two conical sections joined at their larger diameter with a filter enclosed within.

E. J. Pyrcioch

## Gulf Interstate System

Taylor, D. M. GULF INTERSTATE'S NEW STREAMLINED SYSTEM. *Pipe Line Ind.*, 1, 62, 63, 66, 67, 70-74, 77, 78, 80, 82 (1954) October.

The speed of construction and the modern engineering designs, which included an ingenious

emergency kit and push-button compressor station, make the Gulf Interstate system with a 30-inch main line one of the most remarkable accomplishments of the postwar pipe line boom. A complete discussion of the construction operations is given in this article. S. Volchko

THE GULF INTERSTATE STORY. *Gas* 30, 130, 132-138, 140, 142, 147, 148, 152, 154, 158, 160, 164. (1954) October.

Gulf Interstate Gas Co.'s new $130 million, 1150-mile transmission system, which will carry natural gas from Louisiana to the Columbia Gas System, was scheduled to go into operation Nov. 1. Initial input will be 375 MMCF per day. A four-part article describes the organization and general operation of the system, the design of the compressor stations for automatic and remote control, the unitized design of the stations, and the new construction ideas utilized particularly in river crossings and testing.

Publishers Abstract

## $H_2S$ Hydrates

Bottenberg, K. X. (assigned to Phillips Petroleum Co.) METHOD OF PREVENTING HYDROGEN SULFIDE HYDRATE FORMATION. U. S. 2,690,989 (1954) October 5.

In the usual type of deethanization operation $H_2S$ and water tend to concentrate in an intermediate section of the tower with troublesome formation of solid hydrates. In this invention it is proposed to withdraw a side stream of hydrocarbon from the deethanization fractionator in the region of the highest $H_2S$ concentration, treat the withdrawn stream for $H_2S$ removal, and return the treated stream to the fractionator. D. M. Mason

## Loop Line

TRANSCO LAYS 36-INCH LINE. *Oil Gas J.*, 53, 76-77 (1954) October 18: *Gas Age* 114, 40-41 (1954) December 16; *Gas* 30, 96, 7 (1954) December.

The many obstacles are described which were overcome by Associated Pipe Line Contractors, Inc. as the 36-inch Texas-New York-loop line was laid. The sewer-pipe technique was employed. S. Volchko

## Measurement

Overbeck, J. E. REPORT OF COMMITTEE ON GAS MEASUREMENT REPORT No. 3. Am. Gas Assoc. Paper No. OS-54-2, Atlantic City, October 11-13, 1954.

This report is intended to supplement report number 2. The new material includes the effect of valve disturbances on measurement, elbow placement disturbance, orifice meter fittings, the effect of orifice-tube roughness, large diameter orifice metering, and supercompressibility factors. The report apparently will be available in the near future. R. F. Bukacek

## Service Restoration

HOW UNITED RESTORED GAS AFTER FLOOD. *Gas Age*, 114, 55-57 (1954) October 7.

The rapid restoration of normal gas service in flooded sections of the city and avoidance of unnecessary danger to lives and property were made possible by skillful planning by United Gas personnel before flood waters reached Laredo. The distribution department maintained service to all but 800 of 10,000 customers in Laredo, and replaced two permanent mains across the river to Mexico with a temporary line. S. Volchko

## Storage

GAS: SELECTED BIBLIOGRAPHIES—NO. 2; ABOVEGROUND AND UNDERGROUND STORAGE. *Gas* 30, 49, 50 (1954) November.

The second in a series of listings of articles that have appeared in GAS over the past thirty years. Publishers Abstract

## Transmission Control

Dunbar, R. J. and Rufleth, W. SYSTEM-WIDE TELEMETERING AIDS ALGONQUIN GAS OPERATIONS. *Gas* 30, 175-6, 178, 181. (1954) October.

Algonquin Gas Transmission Co. stretches from Lambertville, N.J. to Boston, supplying gas at 33 delivery points to 23 utilities over 500 miles of line. One-third of the system load is concentrated in Boston. Measurements of differential and static pressures from regulator stations within a 15-mile radius of the Boston dispatching office are continuously telemetered with time-multiplexing equipment. At outlying stations a selective calling line, which could be dialed from Boston, was installed. A remote control system was also provided for, to be used in emergencies. Publishers Abstract

## 6. PETROLEUM AND SYNTHETIC LIQUID FUELS

### Fischer-Tropsch Process

Benson, H. E., Field, J. H., Bienstock, D., and Storch, H. H. OIL CIRCULATION PROCESS FOR FISCHER-TROPSCH SYNTHESIS. *Ind. Eng. Chem.*, 46, 2278-85 (1954) November.

Bureau of Mines experiments are described concerning the removal of the high exothermic heat of reaction during oil-circulation process for Fischer-Tropsch synthesis by heating of a recycle oil completely submerges the catalyst. Since cementation of a fixed bed of fused iron-oxide catalyst interrupted the synthesis, a moving or expanded bed operation has been developed in which the catalyst bed was slightly expanded and the particles maintained in motion by upward flow of cooling oil. An over-all conversion of 90% has been obtained.

K. C. Channabasappa

Easly, J. C. and Kellner, H. L. (assigned to Gulf Research and Development Co.) METHOD OF STARTING UP HYDROCARBON SYNTHESIS UNITS. U. S. 2,691,033 (1954) October 5.

In hydrocarbon synthesis processes (contacting of carbon monoxide-hydrogen mixtures with iron catalyst at 350 to 700° F.) the initial reactions taking place during start-up may seriously affect the catalyst and thereby upset the steady-state results. Many of these difficulties may be avoided, it is claimed, by initially pressuring with hydrogen, then gradually introducing synthesis gas at an increasing rate until the feed consists entirely of synthesis gas. By this means, catalyst temperature is kept below about 630° F.

E. B. Shultz

Koelbel, H. and Ackermann, P. (assigned to Rheinpreussen AG fuer Bergbau and Chemie Germany) PROCESS FOR CATALYTIC REDUCTION OF CARBON DIOXIDE WITH HYDROGEN. U.S. 2,692,274 (1954) October 19.

A process for catalytic reduction of carbon dioxide with hydrogen to higher aliphatic compounds of oxygen has been developed. The process consists of repeatedly passing a carbon-dioxide-containing gas mixture substantially free from carbon monoxide in a plurality of passes through a hydrogenation zone in contact with a catalyst made up of a mixture of 0.1 to 6 percent by weight of an alkali metal compound and at least one of the elements of the eighth group of the periodic system. The gas mixture usually containing about 0.2 to 1.05 volumes of carbon dioxide per volume of hydrogen is maintained within each hydrogenation zone, at a temperature of about 150° C. to 380° C. and a pressure of from one to 100 atmospheres, maintaining a rate of gas flow of each gas passage through the zone at a velocity of substantially 100 to 5000 normal cubic meters of gas per hour per cubic meter of catalyst space. According to the authors this process will result in a partial conversion of the total carbon dioxide into aliphatic hydrocarbons in each passage after removing from the gas between two successive stages the water produced in each pass.

K. C. Channabasappa

### Shale Oil Refining

Smith, W. M. (assigned to Standard Oil Development Co.) SHALE OIL REFINING PROCESS. U. S. 2,692,226 (1954) October 19.

Shale oil is improved by hydrogenation and acid treating according to this refining method which calls for contacting the oil at space velocities of about 0.5 to 2 v./v./hr with hydrogen in presence of nickel sulfide catalyst at 2000 to 4000 psig and 700 to 800° F. About 1500 CF of hydrogen is consumed per barrel of oil, effecting saturation of olefins and partial hydrogenation of nitrogen compounds, it is claimed. This is followed by sulfuric or phosphoric and treatment using 2 to 20 pounds of acid per barrel.

E. B. Shultz

## 7. ANALYTICAL METHODS AND TESTS

### Data Evaluation

Stevens, R. F. and Brady, J. F. APPLICATION OF PUNCHED CARDS TO CHEMICAL PROCESS CONTROL. *Chem. Eng. Progress*, 50, 493-96 (1954) October.

A system is described which employs punched cards and conventional accounting department facilities to aid in processing and summarizing analytical results and records from plant log sheets and recording instruments. This system

results in considerable improvement in the speed and ease of evaluating this information in terms of plant operation. D. V. Kniebes

Volk, W. PRECISION OF MASS SPECTROMETER ANALYSES OF CARBURETED WATER GAS. *Anal. Chem.*, **26**, 1771-74 (1954) November.

Data on mass spectrometer analyses obtained by the National Bureau of Standards in 1950 have been analyzed statistically for the components of within-laboratory precisions. About 50% of the within-laboratory variance comes from the spectrometer, the calculators contribute an insignificant amount, operators contribute about 30%, and the balance of the variance is unaccounted for. The within-laboratory mass spectrometer precisions are better than similar precisions by chemical analysis, while between-laboratory checks by mass spectrometer are not as good as similar checks by chemical analysis. The analysis of variance technique used for the precision calculations can be used for other step-wise analytical procedures to find the different components of the variance.

Author's Abstract

## Dust Determination

Holby, W. H. (assigned to The General Power Plant Corp.) APPARATUS FOR DETERMINING AND RECORDING THE DUST CONTENT OF FLUE GAS. U. S. 2,691,737 (1954) October 12.

An apparatus is described which employs a photo-electric cell in the sampling tube to determine and continuously record the dust content of flue gas. Compressed air is introduced to prevent dust and moisture from obscuring the cell lens. By means of a telescoping arrangement, very dirty gas may be analyzed by reducing the length of sample.

D. J. Dennison

## Infrared Analysis

Wilks, P. A., Jr. CONTINUOUS ANALYSIS VIA INFRARED-5 ETHYLENE. *Oil Gas J.*, 53, 91-92 (1954) October 25.

A description is presented of the application of a nondispersive infrared analyser for the continuous analysis of plant ethylene streams. The instrument responds to the ethylene concentration by shaft movement which is recorded, and which later may be used for automatic control of evironmental factors of the process.

D. V. Kniebes

## Instrumental Drift

Youden, W. J. INSTRUMENTAL DRIFT. *Science*, **120**, 627-31 (1954) October 22.

A statistical method for the detection and correction of instrumental drift is described. The method includes a means of minimizing personal bias in reading the instrument. S. A. Weil

## Sulfur Determination

Fritz, J. S. and Freeland, M. Q. DIRECT TITRIMETRIC DETERMINATION OF SULFATE. *Anal. Chem.*, **26**, 1593-1595 (1954) October.

This work was prompted by the need for a rapid, accurate, and widely applicable titrimetric method for sulfate. The method proposed involves direct titration of sulfate with standard barium solution. Alizarin Red S serves as the indicator, giving a sharp, vivid change from yellow to pink at the end point. The titration is carried out in 30 to 40% alcohol, as no end point is observed in water alone. Equilibrium is quickly attained, permitting a rapid titration. Coprecipitation errors are greater than for gravimetric sulfate methods, but most of these can be avoided by the preliminary removal of cations with an ion exchange column. The simple titrimetric procedure should be useful in many cases where a rapid approximation of sulfate is required. In the absence of interfering anions the ion exchange-titrimetric method is as precise as the gravimetric method and considerably faster. Authors' Abstract

## Toxicity Values

Schrenk, H. H. INDUSTRIAL HYGIENE. *Ind. Eng. Chem.*, 46, 111A-113A (1954) October.

The toxicity of ozone, nitrogen pentoxide and nitrogen dioxide and the influence of nitrogen oxides on the toxicity of ozone are discussed. Changes in threshold limit values published by the American Conference of Governmental Industrial Hygienists in April, 1954 are pointed out. Tentative values for some of the 39 additional compounds not previously listed are given. D. J. Dennison

# 8. GENERAL AND PHYSICAL CHEMISTRY

## Argon Production

ON THE ARGON FRONT. *Chem. Week,* 75, 93-96 (1954) October 16.

The spectacular rise in argon output over the last ten years is due mainly to the development of inert-atmosphere welding of nonferrous metals. One producer now accounts for 80% of total U.S. production, and only recently have others come into the field. Development work, aiming towards better recovery, is going ahead in anticipation of booming demand in the immediate future. D. J. Dennison

## Heptane Properties

Douglas, T. B., Furukawa, G. T., McCoskey, R. E., and Ball, A. F. CALORIMETRIC PROPERTIES OF NORMAL HEPTANE FROM 0° to 520° K. *J. Res. Nat. Bur. Stands.,* 53, (1954) September.

Precise measurements of the heat capacity of solid and liquid n-heptane from 20° to 523° K are described. An adiabatic calorimeter, with which were determined also the triple point and the heat of fusion, was used from 20° to 370° K, whereas a drop method was used with a Bunsen ice calorimeter from 273° to 523° K. These two series of heat-capacity measurements and three other series of independent values show a maximum difference of approximately 0.25 percent in the range 50° to 370° K. Besides the heat capacity, the enthalpy, entropy, and Gibbs free energy of the solid and liquid at saturation pressures from 0° to 520° K are derived and tabulated. The same properties of the ideal gas from 298° to 470° K are derived by making use of published precise measurements of gaseous heat capacity, heat of vaporization, and the normal boiling point. Interconsistency in the values of the various thermal properties is shown by the fact that the vapor pressures calculated from these values agree with those precisely measured by other investigators between 299° and 372° K to within ±0.1 percent. Authors' Abstract

## Viscosity of Gases

Carr, N. L., Kobayashi, R., and Burrows, D. B. VISCOSITY OF HYDROCARBON GASES UNDER PRESSURE. *Corrosion Techn.,* 6, 47-55 (1954) October.

The viscosity of hydrocarbon mixtures, whether in the gas or liquid phase, is a function of pressure, temperature, and phase composition. This paper presents methods for the prediction of the viscosity of the gas or less dense fluid phase over the practical range of pressure, temperature, and phase compositions encountered in surface and subsurface petroleum production operations. The correlation necessary to predict the effect of pressure on viscosities is presented in Part I. Serious discrepancies in high-pressure gas viscosity data in the literature are discussed. The application of the correlation to predict absolute viscosities is discussed in Part II. Auxiliary correlations are presented to enable calculations of viscosities from a knowledge of the pressure, temperature, and gravity of the gas phase. Authors' Abstract

VISCOMETRY OF GASES AT HIGH TEMPERATURES AND PRESSURES. *Chem. Process Eng.* (British) 35, 321-22 (1954) October.

The U.S. National Bureau of Standards has developed a capillary-type viscometer for use with gases at temperatures from 60 to 2500° F. and pressures up to 10000 psi. A head of mercury forces gas through the capillary in a calibrated volumetric flask. Pressure drop in the system can be controlled so that viscous conditions are maintained in the tube. Other applications for the apparatus such as in gravity or temperature or measurements are discussed. R. E. Peck

## Ultraviolet Spectra

Yarborough, V. A., Haskin, J. F., and Lambdin, W. J. TEMPERATURE DEPENDENCE OF ABSORBANCE IN ULTRAVIOLET SPECTRA OF ORGANIC MOLECULES. *Anal. Chem.,* 26, 1576-78 (1954) October.

The ultraviolet spectra of molecules change with the temperature. Quantitative temperature coefficients of absorbance, however, are not generally available. The variations of absorbance with temperature of the sample in the ultra-violet spectra of 19 typical organic compounds have been studied at increments be-

tween 5° and 33° C., employing methanol and iso-octane as diluents. The variation ranges from 0.0% per ° C. for acetone and 2,5-hexanedione to 0.74% per ° C. for toluene. A Cary spectrometer has been fitted with special cells that permit controlled variation of the temperature of the sample. Authors' Abstract

## 9. ORGANIC CHEMISTRY

### Acetylene Process

Boyer, L. H. (assigned to Phillips Petroleum Co.) MANUFACTURE OF ACETYLENE AND ETHYLENE. U. S. 2,692,294 (1954) October 19.

An application of the pebble heater process to the production of acetylene from light hydrocarbons is described wherein the effluent pebble stream is maintained at a relatively low temperature by withdrawing most of the cracked gas stream from an intermediate temperature zone in the reactor and passing only the remainder through the upper high temperature zone for acetylene production. Because of the low heat load in the hot zone and substantially increased heat load in the vaporizing and moderate temperature zone due to larger amount of mass handled, the pebbles are withdrawn from the bottom of the reactor at relatively low temperatures. However, the yield of acetylene as weight percent of the feed stream to the reactor is low. Ordinary materials are used in construction of the pebble elevator.

J. M. Reid

Garbo, P. W. (assigned to Hydrocarbon Research, Inc.) PROCESS FOR PRODUCING ACETYLENE. U. S. 2,692,901 (1954) October 26.

An improvement is claimed in the production of acetylene by partial combustion of hydrocarbons, wherein the hot product gases leaving the reaction zone are quenched by the introduction of finely-divided $Fe_2O_3$ or $Fe_3O_4$. Heat is removed by sensible adsorption in the solid and by reduction of the higher iron oxides with the hydrogen and carbon monoxide in the product gas. The removal of some hydrogen and carbon monoxide also results in higher concentration of acetylene in the quenched-gas stream.

J. M. Reid

Pichler, H. R. and Chervenak, M. C. (assigned to Hydrocarbon Research, Inc.) PRODUCTION OF ACETYLENE. U. S. 2,692,902 (1954) October 26.

A method of quenching the product gas from the partial combustion acetylene process which at the same time decomposes part of the diacetylene and other higher acetylenes is described. Finely divided activated carbon having an iodine value greater than 100 is entrained into the product gas as the quenching medium.

J. M. Reid

### Alcohol Process

Nelson, C. R. and Courter, M. L. ETHANOL BY HYDRATION OF ETHYLENE. *Chem. Eng. Progress*, 50, 526-31 (1954) October.

The Shell hydration process is described in considerable detail. Ethylene and water are combined in vapor-phase over a phosphoric acid-on-celite catalyst. Optimum conditions are at about 570° F., 1000 psi and 0.6 water to ethylene mole ratio. Curves are presented which show the effect of temperature on conversion at two space velocities. E. B. Shultz

### Ethylene Chemicals

Sherwood, P. W. PARTIAL OXIDATION OF ETHYLENE. *Petroleum Proc.*, 9, 1592-97 (1954) October.

This is a report on the status of ethylene oxide production by partial oxidation, both as to technology and economics. This method is now gaining preference over chlorohydrination. It is estimated that over eighty percent of the new capacity (mid-1953 to the end of 1955) will be based on partial oxidation. Catalyst preparation, effects of process variables, fixed- versus fluidized-bed processes and process economics are all discussed in some detail. E. B. Shultz

### Gas Chemicals

Resen, F. L. SEVEN PLANTS IN ONE MAKE VERSATILE PETROCHEMICAL GIANT. *Oil Gas J.*, 53, 114-15 (1954) October 4.

The new American Cyanamid Petrochemical Plant which uses natural gas as a major raw material produces acetylene, ammonia, hydrocyanic acid, ammonium sulfate, sulfuric acid and acrylonitrile. The various production steps through the plant are outlined briefly.

J. M. Reid

### Mercaptan Reactions

Sehon, A. H. and Darwent, B. D. THE THERMAL DECOMPOSITION OF MERCAPTANS. *J. Am. Chem. Soc.*, **76**, 4806-10 (1954) October 15.

The kinetics of the thermal decompositions of benzyl, methyl, and ethyl mercaptans have been investigated. Activation energies of the reactions were measured and the heat of formation of the SH radical was estimated.

D. M. Mason

## 10. CHEMICAL ENGINEERING

### Computation

Kharbanda, O. P. ONE NOMOGRAM SOLVES SEVERAL PROBLEMS. *Chem. Process Eng.*, (British), **35**, 309-10 (1954) October.

The utility is discussed of circular or elliptic nomograms when the functions of the variables concerned are such that, with the conventional type nomogram, the terminal points would be at infinity. Uses illustrated are calculating liquid and vapor compositions (relative volatility known), converting weight percent to mol percent, and weight percent to volume percent.

R. T. Ellington

Opler, A. SAVE TIME, MONEY, WITH COMPUTERS. *Chem. Eng.*, **61**, 197-208 (1954) October.

The present rate of application of digital computers to industrial research, design, and process control problems indicates the need for the executive who will decide whether his company shall obtain a digital computer, to be familiar with their uses, abilities, costs, and limitations. The answers to many of the questions that are being asked in an attempt to evaluate the installation of computation facilities are presented in this comprehensive 12 page article. The article is written in six main divisions: how to get computing done, considering rental, purchase, and sharing of facilities between departments; cost and obsolescence; what kind of computer, analog or digital, speed and capacity, punched card versus magnetic drum, intermediate speed and capacity as compared to the really large high-speed machines; how machines are operated, including programming and equation translation problems; the personnel necessary to operate the machines, and just what type of problems machines can solve. Three case studies of problems that have been successfully solved are included: a process stream analysis problem; a distillation calculation; and, a mathematical model of a physical system.

B. E. Eakin

### Dust Scrubbing

Walter, F., (assigned to Knapsack-Griesheim AG) PROCESS FOR REMOVING AN ALKALINE-EARTH METAL COMPOUND DUST. U. S. 2,692,815 (1954) October 26.

The alkaline dust carried by raw acetylene gas manufactured from carbide, or by the carbon monoxide from the manufacture of carbide in covered or closed-in furnaces, usually plugs up the bottom packings of cooling towers. This patent claims that addition of 0.1 to 1 gm. of hydrochloric acid to each liter of cooling water can prevent the clogging.

S. Hu

### Kinetics

Corrigan, T. E. CHEMICAL ENGINEERING FUNDAMENTALS. PART III. KINETICS OF HOMOGENEOUS REACTIONS. *Chem. Eng.*, 61, 210-12; 214, 216, 218 (1954) October.

The fundamentals of the kinetics of homogeneous reactions are reviewed for a flow system. The units for the rate constant both in concentration and partial pressure dimensions are presented. The concept of space velocity in connection with a flow reactor, and different hypotheses on methods of imparting energy required for the activation of the reaction are also presented.

S. Mori

### Sulfur Recovery

Keith, C. D. (assigned to Sinclair Refining Co.) CHEMICAL MANUFACTURE. U. S. 2,690,961 (1954) October 5.

This invention relates to the production of elemental sulfur from $H_2S$-bearing gases. It is proposed, after obtaining a mixture of $H_2S$ and $SO_2$ by known methods, to react the $H_2S$ and $SO_2$ to produce colloidal elemental sulfur and polythionic acids by dispersion in an aqueous medium at about 100° to 150° F. The mixture is then heated under pressure to about 250° to 350° F. to convert the sulfur to molten sulfur.

Unreacted gases may be recovered from this stage and recycled by addition to the colloidal sulfur reactor. D. M. Mason

## 11. PROCESS EQUIPMENT AND INSTRUMENTATION

### Flexible Joint

Milam, P. B. (assigned to Phillips Petroleum Co.) FLEXIBLE JOINT FOR PIPE. U.S. 2,691,539 (1954) October 12.

This invention relates to a conduit expansion system and to a deflection joint particularly adapted for use in such a system. As one of its aspects, this invention relates to a deflection joint adapted to be inserted in a length of pipe to permit lateral displacement or deflection of the pipe along its longitudinal axis.

S. Volchko

### Meter Repair

METERS RAISED AND POSITIONED BY PNEUMATIC LIFTING UNITS. *Gas* 30, 120. (1954) October.

Gas meters up to 60-light size may be lifted from floor level, positioned, lowered, and held submerged in testing tanks easily and quickly with this unit. Publishers Abstract

### New Extinguishers

HALOGENATED EXTINGUISHING AGENTS. *Nat. Fire Prot. Assoc. Quart.*, 48, 143-48 (1954) October.

Technical reports by various armed service agencies are presented. These reports evaluate the newer "Halon" compounds as fire extinguishing agents and also present toxicological studies. W. G. Bair

### Pumps

Boggs, J. H., Fitch, E. C. and Woods, A. T. PUMPS. *Petroleum Eng.*, 26, B126, 128, 129, 131, 132, 134-38 (1954) October.

Beginning with some fundamentals of hydraulics and pump technology, this article presents a brief survey of types of pumps. The applications to the drilling industry of the various pumps is indicated, and a more complete analysis is given to reciprocating slush pumps.

E. F. Witt

### Thermocouple

Potter, R. D. CALIBRATION OF A NICKEL-MOLYBDENUM THERMOCOUPLE. *J. Appl. Physics*, 25, 1383-84 (1954) November.

A nickel-molybdenum thermocouple was calibrated against a chrome-alumel standard between 32 to 2242° F. to ±2° accuracy. These results are tabulated. The two couples were welded onto a short length of Pt wire 0.040 in diameter and placed in an electric furnace under an atmosphere of helium. The Speedomax XX millivolt recorder was used to obtain the pertinent data. S. Mori

## 12. MATERIALS OF CONSTRUCTION

### Concrete Construction

Pilling, A. H. and Boll, M. W. CONCRETE CONSTRUCTION: HOW TO PLAN FORMS IN DETAIL. *Construction and Methods*, 36, 108-111 (1954) October.

The type of structure and how it is broken down into individual pours is the first key to form planning. With the aid of the tables of information on construction tolerances for 1) reinforced concrete construction, 2) mass concrete structures, 3) tunnel linings and conduits, and head pressure diagrams, one is able to plan the forms in detail.

S. Volchko

### Copper: Review

Katzen, R. COPPER AND COPPER ALLOYS. *Ind. Eng. Chem.*, 46, 2065-2066 (1954) October.

The subject of copper and copper alloys has not been covered during the past three years in the annual Materials of Construction Reviews. This results primarily from the fact that there have been few significant new developments in production, application, or use of these materials within any of these annual periods. A slow, steady, cumulative advance has been made, however, and this report summarizes only the significant new developments and new data which have been accumulated during the past three years. Author's Abstract

## Gas Industry Corrosion

GAS SELECTED BIBLIOGRAPHIES. 1. CORROSION—ITS CAUSES AND PREVENTION. *Gas* 30, 83-85. (1954) October.

The first in a series of bibliographies selected from articles appearing in *GAS* magazine over the past 30 years. Publishers Abstract

## Inhibitors

Shreir, L. L. CORROSION INHIBITORS. II. INHIBITORS IN PRACTICE. *Corrosion Techn.* (British), 1, 291-294 (1954) October.

The author first discusses the factors to be considered before deciding on the use of an inhibitor. He then deals in turn with the most important inhibitors, namely sodium chromate, sodium nitrite, sodium benzoate and sodium salts of organic acids, and duplex inhibitors. He concludes with some notes on water treatment and the application of phosphates and silicates. The first article (August) outlined the principles of inhibition. (*Gas Abs.*, 10, 188.) Author's Abstract

## Internal Pipe Coating

Hangs, F. E. WHAT ABOUT INTERNAL PIPE COATING? *Pipe Line Industry*, 1, 106-07, 112 (1954) July.

Advantages of cleaning and coating the interior of pipe for a gas, crude or products line are presented. Also it is anticipated that one or two pipe line companies will have some pipe internally coated this year for test purposes and that reliable data will be available by the middle of 1955. S. Volchko

## Refractory Concretes

Hansen, W. C. and Livovich, A. F. FACTORS INFLUENCING THE PHYSICAL PROPERTIES OF REFRACTORY CONCRETES. *Ind. Heating*, 21, 1827-28, 1830, 1832 (1954) September.

Tests were made to determine the effect of six factors on the strength of a refractory concrete prepared from a calcium aluminate cement and crushed high-duty fire-clay brick at varying mix proportions and fire-clay aggregate sizes. Factors considered were firing temperature, curing temperature, preliminary curing, heating time, effect of various sizes of aggregate and effect of cement: aggregate ratio. Results showed that serious strength loss occurs when the concrete is exposed to high temperatures without preliminary curing. E. J. Pyrcioch

## Tape Coatings

NEW CITY GAS SYSTEM IN GEORGIA GIVEN COMPLETE TAPE WRAP. *Gas* 30, 67-8. (1954) October.

The city of Waynesboro, Ga. is investing $257,-823 in a new municipal gas system comprising more than 30 miles of transmission and distribution pipe, and it is the first in the nation to be completely coated with plastic tape. New high-speed cleaning and wrapping equipment was used for the first time with a substantial saving in labor. Details of the installation are given. Publishers Abstract

## Titanium

Clark, H. T., Catlin, J. P., and Gregg, W. E. TITANIUM TECHNOLOGY IN MID-1954. *Ind. Heating*, 21, 1738-40, 42, 44, 46, 48, 50, 1888 (1954) September.

The Kroll process for sponge production and the "cold-mold" process for ingot production are outlined. The alpha and beta crystal structures and types of alloying employed are described. Machining difficulties, attributed to the fact that titanium has many more bonding electrons than other metals, are brought out as is its sensitivity to strain rate in forming.

R. T. Ellington

## Welding Practise

Upson, F. A. FIELD WELDING HEAVY-WALL VESSELS. *Petroleum Refiner*, 33, 117-20 (1954) October.

A presentation of the methods of field welding pressure vessels. Emphasis is placed on welding technique, preparation of the surface and stress-relieving after welding. W. G. Bair

STRESS-RELIEVING A LARGE WELDED PRESSURE VESSEL. *Chem. Process Engr.*, (British) 35, 327-28 (1954) October.

The use of an inexpensive temporary furnace for stress-relieving the girth weld on a large fractionating column is described. The furnace was constructed around a section of the column and disassembled when the job was completed.

R. T. Ellington

# SERVICES TO READERS

### Bibliographies and Literature Searches

The library will prepare bibliographies and make literature searches on a cost basis plus a service charge. A comprehensive statement outlining the problem in detail must be presented with the request.

### Photocopies

Photostatic or microfilm copies of articles abstracted in *Gas Abstracts* are available at cost.

### Abstracts on Cards

Copies of all abstracts in *Gas Abstracts* are available on 5 x 8 cards; information on this service will be furnished on request.

## Periodicals Abstracted for GAS ABSTRACTS

Acta Crystallographica
Air Conditioning, Heating and Ventilating
American Chemical Society. Journal
American Documentation
American Gas Association Monthly
American Gas Journal
American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
American Society of Mechanical Engineers. Transactions
Analytica Chemica Acta
Analytical Chemistry
Appliance Manufacturer
Applied Mechanics Review
Applied Spectroscopy
Association for Computing Machinery, Journal
Australian Journal of Applied Science
Australian Journal of Chemistry

Battelle Technical Review
Bituminous Coal Research
Brennstoff-Chemie
British Coal Utilization Research Association Monthly Bulletin and Quarterly Gazette
Butane-Propane News

California Oil World
Canadian Chemical Processing
Canadian Gas Journal
Canadian Journal of Chemistry
Canadian Journal of Physics
Canadian Journal of Technology
Chemical Abstracts
Chemical and Engineering News
Chemical and Process Engineering
Chemical Bulletin
Chemical Engineering
Chemical Engineering Costs Quarterly
Chemical Engineering Progress
Chemical Engineering Science
Chemical Processing
Chemical Reviews
Chemical Society (London) Journal
Chemical Week
Chemist
Chemistry
Chemistry and Industry
Coal Heat
Coke and Gas
Combustion
Compressed Air
Computers and Automation
Construction Methods and Equipment
Corrosion
Current Chemical Papers (Chem. Soc., London)

Drilling

Electronics
Endeavour
Engineers' Digest
Erdöl und Kohle

Faraday Society. Transactions
Fuel
Fuel Abstracts
Fuel Efficiency
Fueloil and Oil Heat

Gas
Gas Age
Gas and Oil Power
Gas Heat
Gas Journal
Gas News (Chicago)
Gas Council Publications
Gas Times
Gas und Wasserfach
Gas World

Heating, Piping and Air Conditioning

Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Finishing
Industrial Gas (American)
Industrial Gas (British)
Industrial Heating
Institute of Fuel (British). Journal
Institute of Petroleum (British). Journal
Institute of Gas Technology Publications
Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

Jet Propulsion
Journal des Usines a Gaz
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Education
Journal of Chemical Physics
Journal of Engineering Education
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical Chemistry
Journal of Research (National Bureau of Standards)
Journal of Scientific Instruments

Laboratory Practice
LP-Gas
Lubrication

Materials and Methods
Mathematical Aids
Mechanical Engineering
Mining Engineering

National Advisory Committee for Aeronautics, Reports
National Fire Protection Association Quarterly
National Gas Bulletin of Australia
National Petroleum News

Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Oil, Paint and Drug Reporter
Optical Society of America. Journal

Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physics Today
Pipe Line Industry
Power
Producers Monthly

Public Utilities Fortnightly

Refrigerating Engineering
Research Reports
Review of Scientific Instruments
Revue Generale du Gaz
Rivista dei Combustibili

Science
Southern Gas Association Progress
Spectrochemica Acta
Svenska Gasverksföreningens Månadsblad

Technical News Bulletin

U.S. Bureau of Mines. Bulletins, Information Circulars, Reports of Investigations and Technical Papers

World Oil
World Petroleum

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY